1041_1st Exam_1041021(A)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A physical change
   A) occurs when water is evaporated.
   B) occurs when sugar is heated into caramel.
   C) occurs when propane is burned for heat.
   D) occurs when glucose is converted into energy within your cells.
   E) occurs when iron rusts.

   Answer: A

2) Which of the following statements about energy is FALSE?
   A) Kinetic energy is the energy associated with its position or composition.
   B) Energy can be converted from one type to another.
   C) The total energy of a system remains constant.
   D) Energy is the capacity to do work.
   E) Systems tend to change in order to lower their potential energy.

   Answer: A

3) Define potential energy.
   A) energy associated with the position or composition of an object
   B) energy associated with the temperature of an object
   C) energy associated with the force of an object
   D) energy associated with the motion of an object
   E) energy associated with the gravity of an object

   Answer: A

4) Which of the following represents a *hypothesis*?
   A) Sodium reacts with water to form sodium hydroxide and hydrogen gas.
   B) When a substance combusts, it combines with air.
   C) Nickel has a silvery sheen.
   D) Nitrogen gas is a fairly inert substance.
   E) When wood burns, heat is given off.

   Answer: B

5) Dalton's Atomic Theory states
   A) that matter is composed of small indestructible particles.
   B) that an atom is predominantly empty space.
   C) that all elements have several isotopes.
   D) that the properties of matter are determined by the properties of atoms.
   E) that energy is neither created nor destroyed during a chemical reaction.

   Answer: A

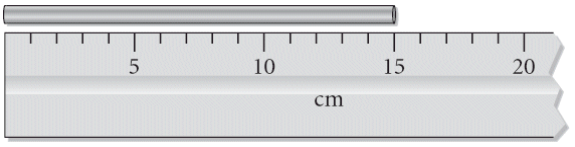
6) How many significant figures are in the measurement, 20.300 m?
   A) 5 B) 2 C) 3 D) 1 E) 4

   Answer: A

7) A chemist mixes sodium with water and witnesses a violent reaction between the metal and water. This is best classified as
   A) a theory B) an observation C) a law D) a hypothesis

   Answer: B

8) Read the length of the metal bar with the correct number of significant figures.



A) 15.0 cm B) 20 cm C) 15.000 cm D) 15 cm E) 15.00 cm

Answer: A

9) What answer should be reported, with the correct number of significant figures, for the following calculation?
6.78 x 5.903 x (5.489 - 4.01)

A) 59.193 B) 59 C) 59.2 D) 50 E) 59.19

Answer: C

10) Perform the calculation to the correct number of signifi cant figures.

$$(8.01 - 7.50)/3.002$$

A) 0.1698867 B) 0.1700 C) 0.170 D) 0.17

Answer: D

11) What is the mass of a 1.75 L sample of a liquid that has a density of 0.921 g/mL?

A) 1.61×10^{3} g B) 1.902×10^{-3} g C) 1.612×10^{3} g D) 1.90×10^{-3} g

Answer: A

12) Which property of rubbing alcohol is a chemical property?

A) its density (0.786 g/cm^3) B) its boiling point (82.5 °C)
C) its flammability D) its melting point (-89 °C)

Answer: C

13) A compound containing only carbon and hydrogen has a carbon-to-hydrogen mass ratio of 11.89. Which carbon-to-hydrogen mass ratio is possible for another compound composed only of carbon and hydrogen?

A) 3.97 B) 4.66 C) 7.89 D) 2.50

Answer: A

14) Determine the number of protons and neutrons in the isotope Fe-58.

A) 26 protons and 58 neutrons B) 58 protons and 58 neutrons
C) 32 protons and 26 neutrons D) 26 protons and 32 neutrons

Answer: D

15) Which idea came out of Rutherford's gold foil experiment?

A) Atoms contain protons and neutrons. B) Elements have isotopes.
C) Matter is composed of atoms. D) Atoms are mostly empty space.

Answer: D

16) Which sample contains the greatest number of atoms?

A) 14 g C B) 49 g Cr C) 202 g Pb D) 102 g Ag

Answer: A

17) An isotope of an element contains 82 protons and 122 neutrons. What is the symbol for the isotope?

A) $^{122}_{40}Zr$ B) $^{204}_{40}Zr$ C) $^{204}_{82}Pb$ D) $^{122}_{82}Pb$

Answer: C

18) Calculate the atomic mass of gallium if gallium has 2 naturally occurring isotopes with the following masses and natural abundances:

Ga-69	68.9256 amu	60.11%
Ga-71	70.9247 amu	39.89%

A) 69.93 amu B) 69.72 amu C) 70.00 amu D) 69.80 amu E) 70.68 amu

Answer: B

19) Which of the following statements about isotopes is TRUE?

A) An isotope of an atom with a larger number of neutrons is larger than an isotope of the same atom that contains fewer neutrons.
B) Isotopes of the same element don't usually have the same properties.
C) Isotopes of the same element differ only in the number of electrons they contain.
D) Some elements have 3 or more naturally occurring isotopes.
E) Isotopes of the same element have the same mass.

Answer: D

20) What species is represented by the following information?

$p^+ = 17$ $n° = 18$ $e^- = 18$

A) Cl^- B) Cl C) Ar^+ D) Ar E) Kr

Answer: A

21) Which of the following statements is FALSE?

A) Atoms are usually larger than their corresponding cation.
B) Anions are usually larger than their corresponding atom.
C) Metals tend to form cations.
D) Nonmetals tend to gain electrons.
E) The halogens tend to form 1+ ions.

Answer: E

22) A 20.0 g sample of an element contains 4.95×10^{23} atoms.
Identify the element.

A) Mg B) Cr C) Fe D) O

Answer: A

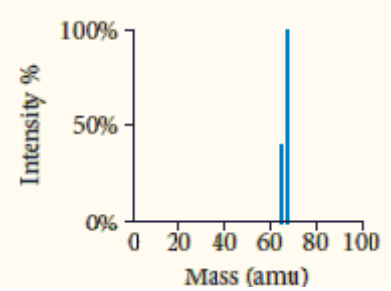
23) Determine the number of electrons in the Cr^{3+} ion.

A) 27 electrons B) 21 electrons C) 3 electrons D) 24 electrons

Answer: B

24) Copper has two naturally occurring isotopes with masses 62.94 amu and 64.93 amu and has an atomic mass of 63.55 amu. Which mass spectrum is most likely to correspond to a naturally occurring sample of copper?

A)



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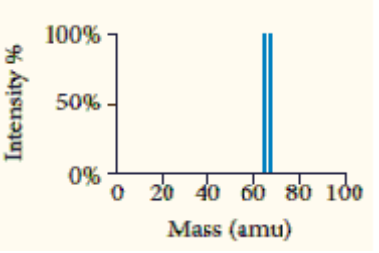

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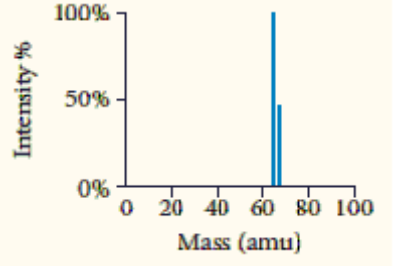
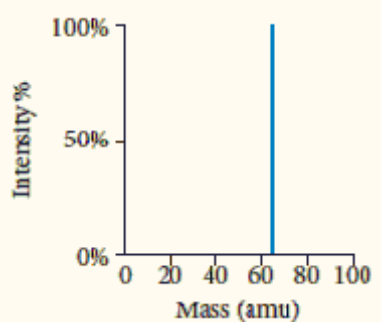


D)



Answer: C

25) Which substance is an ionic compound?

A) N_2O_4 B) He C) SrI_2 D) CCl_4

Answer: C

26) Name the compound SrI_2.

A) strontium(II) diiodide
B) strontium iodide
C) strontium diiodide
D) strontium(II) iodide

Answer: B

27) Name the compound P_2I_4.

A) phosphorus(II) iodide
B) diphosphorus tetraiodide
C) phosphorus diiodide
D) phosphorus iodide

Answer: B

28) A compound is 52.14% C, 13.13% H, and 34.73% O by mass. What is the empirical formula of the compound?

A) C_3HO_6 B) C_2H_6O C) C_4HO_3 D) $C_2H_8O_3$

Answer: B

29) Combustion of 30.42 g of a compound containing only carbon, hydrogen, and oxygen produces 35.21 g CO_2 and 14.42 g H_2O. What is the empirical formula of the compound?

A) $C_4H_8O_6$ B) $C_2H_4O_3$ C) C_6HO_{12} D) $C_2H_2O_3$

Answer: B

30) Determine the molecular formula of a compound that has a molar mass of 183.2 g/mol and an empirical formula of $C_2H_5O_2$.

A) $C_6H_{15}O_6$ B) $C_8H_{20}O_8$ C) $C_2H_5O_2$ D) $C_3H_7O_3$ E) $C_4H_{10}O_4$

Answer: A

31) What are the correct coeffi cients (reading from left to right)when the chemical equation is balanced?

$$\_\_PCl_{3(l)} + \_\_H_2O_{(l)} \rightarrow \_\_H_3PO_{3(aq)} + \_\_HCl_{(aq)}$$

A) 3, 6, 1, 9 B) 1, 2, 1, 1 C) 1, 3, 1, 3 D) 1, 3, 2, 1

Answer: C

32) Determine the volume of hexane that contains 5.33×10^{22} molecules of hexane. The density of hexane is 0.6548 g/mL and its molar mass is 86.17 g/mol.

A) 13.5 mL B) 7.40 mL C) 11.6 mL D) 12.4 mL E) 8.59 mL

Answer: C

33) An ionic bond is best described as

A) the attraction between 2 metal atoms.
B) the transfer of electrons from one atom to another.
C) the attraction between 2 nonmetal atoms.
D) the sharing of electrons.
E) the attraction that holds the atoms together in a polyatomic ion.

Answer: B

34) Determine the name for $CoCl_2 \cdot 6H_2O$. Remember that Co forms several ions.

A) cobalt chloride hydrate
B) cobalt (II) chloride hexahydrate
C) cobalt (II) chloride heptahydrate
D) cobalt (I) chloride
E) cobalt (I) chloride heptahydrate

Answer: B

35) How many SO_3^{2-} ions are contained in 99.6 mg of Na_2SO_3? The molar mass of Na_2SO_3 is 126.05 g/mol.

A) 4.76×10^{20} SO_3 ions
B) 2.10×10^{21} SO_3 ions
C) 9.52×10^{20} SO_3 ions
D) 1.05×10^{21} SO_3 ions
E) 1.52×10^{27} SO_3 ions

Answer: A

36) Write a balanced equation to show the reaction of sulfurous acid with lithium hydroxide to form water and lithium sulfite.

A) $HSO_3(aq) + LiOH(aq) \rightarrow H_2O(l) + LiSO_3(aq)$

B) $HSO_4(aq) + LiOH(aq) \rightarrow H_2O(l) + LiSO_4(aq)$

C) $H_2SO_3(aq) + 2\ LiOH(aq) \rightarrow 2\ H_2O(l) + Li_2SO_3(aq)$

D) $H_2SO_4(aq) + LiOH(aq) \rightarrow H_2O(l) + Li_2SO_4(aq)$

E) $H_2S(aq) + 2\ LiOH(aq) \rightarrow 2\ H_2O(l) + Li_2S(aq)$

Answer: C

37) Manganese(IV) oxide reacts with aluminum to form elemental manganese and aluminum oxide:

$$3\ MnO_2 + 4\ Al \rightarrow 3\ Mn + 2\ Al_2O_3$$

What mass of Al is required to completely react with 25.0 g MnO_2 ?

A) 7.76 g Al B) 33.3 g Al C) 5.82 g Al D) 10.3 g Al

Answer: D

38) What is the molarity of a solution containing 55.8 g of $MgCl_2$ dissolved in 1.00 L of solution?

A) 0.59 M B) 0.558 M C) 0.586 M D) 55.8 M

Answer: C

39) What is the net ionic equation for the reaction that occurs when aqueous solutions of KOH and $SrCl_2$ are mixed?

A) $K^+_{(aq)} + Cl^-_{(aq)} \rightarrow KCl_{(s)}$

B) $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$

C) $Sr^{2+}_{(aq)} + 2\ OH^-_{(aq)} \rightarrow Sr(OH)_{2(s)}$

D) None of the above because no reaction occurs

Answer: D

40) Sodium reacts with water according to the reaction :

$$2\ Na_{(s)} + 2\ H_2O_{(l)} \rightarrow 2\ NaOH_{(aq)} + H_{2(g)}$$

Identify the oxidizing agent.

A) $NaOH_{(aq)}$ B) $H_{2(aq)}$ C) $Na_{(s)}$ D) $H_2O_{(l)}$

Answer: D

41) What is the oxidation state of carbon in CO_3^{2-} ?

A) -3 B) +4 C) +3 D) -2

Answer: B

42) Global warming is thought to be caused by the increase of one particular gas. Name the gas.

A) carbon monoxide
B) nitrogen
C) oxygen
D) helium
E) carbon dioxide

Answer: E

43) How many moles of nitrogen are formed when 58.6 g of KNO_3 decomposes according to the following reaction? The molar mass of KNO_3 is 101.11 g/mol.

$$4\ KNO_3(s) \rightarrow 2\ K_2O(s) + 2\ N_2(g) + 5\ O_2(g)$$

A) 0.290 mol N_2
B) 1.73 mol N_2
C) 18.5 mol N_2
D) 0.724 mol N_2
E) 0.580 mol N_2

Answer: A

44) Give the percent yield when 28.16 g of CO_2 are formed from the reaction of 8.000 moles of C_8H_{18} with 4.000 moles of O_2.

$$2\ C_8H_{18} + 25\ O_2 \rightarrow 16\ CO_2 + 18\ H_2O$$

A) 25.00% B) 50.00% C) 20.00% D) 12.50%

Answer: A

45) Identify acetic acid.
A) strong electrolyte, strong acid
B) weak electrolyte, strong acid
C) strong electrolyte, weak acid
D) nonelectrolyte
E) weak electrolyte, weak acid

Answer: E

46) Choose the statement below that is TRUE.
A) The term "strong electrolyte" means that the substance is extremely reactive.
B) The term "weak electrolyte" means that the substance is inert.
C) A molecular compound that does not ionize in solution is considered a strong electrolyte.
D) A strong acid solution consists of only partially ionized acid molecules.
E) A weak acid solution consists of mostly nonionized acid molecules.

Answer: E

47) Give the <u>complete ionic equation</u> for the reaction (if any) that occurs when aqueous solutions of lithium sulfide and copper (II) nitrate are mixed.

A) $Li^+(aq) + S^-(aq) + Cu^+(aq) + NO_3^-(aq) \rightarrow CuS(s) + LiNO_3(aq)$

B) $Li^+(aq) + SO_4^{2-}(aq) + Cu^+(aq) + NO_3^-(aq) \rightarrow CuS(s) + Li^+(aq) + NO_3^-(aq)$

C) $2\ Li^+(aq) + S^{2-}(aq) + Cu^{2+}(aq) + 2\ NO_3^-(aq) \rightarrow Cu^{2+}(aq) + S^{2-}(aq) + 2\ LiNO_3(s)$

D) $2\ Li^+(aq) + S^{2-}(aq) + Cu^{2+}(aq) + 2\ NO_3^-(aq) \rightarrow CuS(s) + 2\ Li^+(aq) + 2\ NO_3^-(aq)$

E) No reaction occurs.

Answer: D

48) The titration of 80.0 mL of an unknown concentration H_3PO_4 solution requires 126 mL of 0.218 M KOH solution. What is the concentration of the H_3PO_4 solution (in M)?

A) 0.114 M B) 0.0461 M C) 0.343 M D) 1.03 M E) 0.138 M

Answer: A

49) What element is undergoing oxidation (if any) in the following reaction?

$$Zn(s) + 2\ AgNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + 2\ Ag(s)$$

A) Ag
B) Zn
C) O
D) N
E) This is not an oxidation-reduction reaction.

Answer: B

50) Determine the oxidation state of P in PO_3^{3-}.

A) +2 B) 0 C) -3 D) +6 E) +3

Answer: E